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## Floating catalyst chemical vapor deposition synthesis of carbon nanotubes for electronics applications

# physikalisches

Mo. 24.1.22  
 16:00 Uhr  
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We discuss the floating catalyst chemical vapor deposition (FC-CVD) synthesis of single walled carbon nanotubes (SWNTs), especially the tuning of tube atomic structure i.e. (n,m) distributions.

Ferrocene has been used as the catalyst nanoparticle precursor and CO, C<sub>2</sub>H<sub>4</sub> and ethanol as the carbon precursors, with CO<sub>2</sub>, H<sub>2</sub>O and H<sub>2</sub>S as the additives to tune the (n,m) distributions. By introducing CO<sub>2</sub> with CO as the carbon source and in-situ ferrocene decomposition generated Fe catalyst nanoparticles, we directly deposited SWNT films with tunable (n,m) distribution as well as green and brown colors. We ascribed colors to suitable diameter and narrow (n,m) distributions, determined using the electron diffraction.

We will present results on using ethylene as the carbon source in nitrogen carrier gas with the addition of H<sub>2</sub>O vapor to synthesize SWNTs with extremely narrow (n,m) distribution and directly deposit colorful films. Also, we will present recent results on double walled CNT synthesis and the deposition of highly conductive thin film with 35 ohms/sq sheet resistance at 90 % light transmission, using methane as the carbon source and elemental sulfur as the growth promoter. Finally, we discuss the development of CNT thin films for flexible electronics applications.

### Direct FC-CVD synthesis of colored SWNT films

